**ANDROID (Operating System)**

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**Abstract**

 **Android is a mobile operating system used for Mobile Devices Android is based upon a modified version of the** [**Linux kernel**](http://en.wikipedia.org/wiki/Linux_kernel) **. The Android corporation which Initiated the Development of android had been purchased by Google company on 2005 .Google decided to extend its features then it tied up with open alliance handset , a consortium of 79 hardware, software, and telecom companies devoted to advancing open standards for mobile devices. Google has made most of the Android platform available under the Apache free-software and open source license. The android SDK can be downloaded from its official website which includes virtual mobile Device, Google libraries and Tutorials** .

**Introduction**

 Android is a [mobile operating system](http://en.wikipedia.org/wiki/Mobile_operating_system) initially developed by Android Inc. Android was bought by [Google](http://en.wikipedia.org/wiki/Google) in [2005](http://en.wikipedia.org/wiki/2005). Android is based upon a modified version of the [Linux kernel](http://en.wikipedia.org/wiki/Linux_kernel). Google and other members of the [Open Handset Alliance](http://en.wikipedia.org/wiki/Open_Handset_Alliance) collaborated on Android's development and release. The Android Open Source Project (AOSP) is tasked with the maintenance and further development of Android. Android has a large community of developers writing [application programs](http://en.wikipedia.org/wiki/Application_software) ("*apps*") that extend the functionality of the devices. There are currently over 200,000 apps available for Android. [Android Market](http://en.wikipedia.org/wiki/Android_Market) is the online app store run by Google, though apps can be downloaded from third-party sites ([AT&T](http://en.wikipedia.org/wiki/AT%26T) permits third-party apps only on their Aria phone). Developers write primarily in the [Java language](http://en.wikipedia.org/wiki/Java_%28programming_language%29), controlling the device via Google-developed Java libraries. [Python](http://en.wikipedia.org/wiki/Python_%28programming_language%29), [Ruby](http://en.wikipedia.org/wiki/Ruby_%28programming_language%29) and other languages are also available for Android development via the [Android Scripting Environment](http://code.google.com/p/android-scripting/).

**Chronicle of Android**

Google [**acquired the startup company Android Inc**](http://www.businessweek.com/technology/content/aug2005/tc20050817_0949_tc024.htm). in 2005 to start the development of the Android Platform The key players at Android Inc. included Andy Rubin, Rich Miner, Nick Sears, and Chris White.In late 2007, a group of industry leaders came together around the Android Platform to form the [**Open Handset Alliance**](http://www.openhandsetalliance.com/) ,alliance’s goal is to innovate rapidly and respond better to consumer needs, and its first key outcome was the Android Platform. Android was designed to serve the needs of mobile operators, handset manufacturers, and application developers. The members have committed to release significant intellectual property through the open source Apache License, Version 2.0. The Android SDK was first issued as an “early look” release in November 2007. In September 2008, T-Mobile announced the availability of T-Mobile G1, the first smartphone based on the Android platform. A few days after that, Google announced the availability of Android SDK Release Candidate 1.0. In October 2008, Google made the source code of the Android platform available under Apache’s open source license.

**Core of Android**

The Android operating system [software stack](http://en.wikipedia.org/wiki/Software_stack) consists of [Java applications](http://en.wikipedia.org/wiki/Java_%28programming_language%29) running on a Java-based, [object-oriented](http://en.wikipedia.org/wiki/Object-oriented) [application framework](http://en.wikipedia.org/wiki/Application_framework) on top of [Java core libraries](http://en.wikipedia.org/wiki/Java_Class_Library) running on a [Dalvik virtual machine](http://en.wikipedia.org/wiki/Dalvik_%28software%29) featuring [JIT compilation](http://en.wikipedia.org/wiki/Just-in-time_compilation). Libraries written in C include the surface manager, OpenCore [media framework](http://en.wikipedia.org/wiki/Multimedia_framework), [SQLite](http://en.wikipedia.org/wiki/SQLite) relational [database management system](http://en.wikipedia.org/wiki/Relational_database_management_system), [OpenGL ES 2.0](http://en.wikipedia.org/wiki/OpenGL_ES) [3D graphics](http://en.wikipedia.org/wiki/3D_computer_graphics) [API](http://en.wikipedia.org/wiki/Application_programming_interface), [WebKit layout engine](http://en.wikipedia.org/wiki/WebKit), [SGL](http://en.wikipedia.org/wiki/Skia_Graphics_Engine) graphics engine, [SSL](http://en.wikipedia.org/wiki/Transport_Layer_Security), and [Bionic libc](http://en.wikipedia.org/wiki/GNU_C_Library#Use_in_small_devices). The Android operating system consists of 12 million [lines of code](http://en.wikipedia.org/wiki/Source_lines_of_code) including 3 million lines of [XML](http://en.wikipedia.org/wiki/Xml), 2.8 million lines of [C](http://en.wikipedia.org/wiki/C_%28programming_language%29), 2.1 million lines of [Java](http://en.wikipedia.org/wiki/Java_%28programming_language%29), and 1.75 million lines of [C++](http://en.wikipedia.org/wiki/C%2B%2B).

**Versions of Android**

* **Android 1.0 Released 23 September 2008**
* **On 9 February 2009, Android 1.1** update for Android was released for T-Mobile G1 Only. Multiple resolved issues API changes ,Maps adds details and reviews,Screen timeout longer when using speakerphone,"Show" & "Hide" Dialpad included in-call menu,Support for saving attachments frm MMS,Support for marquee in layouts
* **On 30 April 2009, the official 1.5 (Cupcake)** update for Android was released. There were several new features and UI updates includes ,Ability to record and watch videos through camcorder modeUploading videos to YouTube and pictures to Picasa directly from the phone,A new soft-keyboard with text-prediction,Bluetooth [A2DP](http://en.wikipedia.org/wiki/A2DP) and [AVRCP](http://en.wikipedia.org/wiki/AVRCP) support,Ability to automatically connect to a Bluetooth headset within a certain distance,New widgets and folders that can populate the Home screens,Animated screen transitions
* **On 15 September 2009, the 1.6 (Donut)** SDK was released. Included in the update were: An improved Android Market experience,An integrated camera, camcorder, and gallery interface,Gallery now enables users to select multiple photos for deletion,Updated Voice Search, with faster response and deeper integration with native applications, including the ability to dial contacts,Updated search experience to allow searching bookmarks, history, contacts, and the web from the home screen,Updated technology support for [CDMA](http://en.wikipedia.org/wiki/IS-95)/[EVDO](http://en.wikipedia.org/wiki/Evolution-Data_Optimized), [802.1x](http://en.wikipedia.org/wiki/IEEE_802.1X), [VPNs](http://en.wikipedia.org/wiki/Virtual_private_network), and a [text-to-speech](http://en.wikipedia.org/wiki/Speech_synthesis) engine,Support for [WVGA](http://en.wikipedia.org/wiki/Wide_VGA) screen resolutions,Speed improvements in searching and camera applications,Gesture framework and GestureBuilder development tool,Google free [turn-by-turn navigation](http://en.wikipedia.org/wiki/Turn-by-turn_navigation)
* **On 26 October 2009, the 2.0 (Eclair) SDK** was released.[[45]](http://en.wikipedia.org/wiki/Android_%28operating_system%29#cite_note-44) Changes include:[[46]](http://en.wikipedia.org/wiki/Android_%28operating_system%29#cite_note-eclair-highlights-45) ,Optimized hardware speed,Support for more screen sizes and resolutions,Revamped UI,New Browser UI and [HTML5](http://en.wikipedia.org/wiki/HTML5) support,New contact lists,Better contrast ratio for backgrounds,Improved Google Maps 3.1.2,Microsoft Exchange Server by [Exchange ActiveSync](http://en.wikipedia.org/wiki/Exchange_ActiveSync) 2.5 support,Built in flash support for Camera,Digital Zoom,MotionEvent class enhanced to track multi-touch events[[47]](http://en.wikipedia.org/wiki/Android_%28operating_system%29#cite_note-46),Improved virtual keyboard,Bluetooth 2.1,Live Wallpapers
* **On 20 May 2010, the 2.2 (Froyo) SDK** was released.[[50]](http://en.wikipedia.org/wiki/Android_%28operating_system%29#cite_note-froyo-dev-blog-49) Changes included:General Android OS speed, memory, and performance optimizations,Additional application speed improvements courtesy of [JIT](http://en.wikipedia.org/wiki/Just-in-time_compilation) implementation,Integration of [Chrome](http://en.wikipedia.org/wiki/Google_Chrome)'s [V8 JavaScript engine](http://en.wikipedia.org/wiki/V8_%28JavaScript_engine%29) into the Browser application,Increased Microsoft Exchange support (security policies, auto-discovery, GAL look-up, calendar synchronization, remote wipe),Improved application launcher with shortcuts to Phone and Browser applications,USB tethering and Wi-Fi hotspot functionality,Added an option to disable data access over [mobile network](http://en.wikipedia.org/wiki/Mobile_network),Updated Market application with batch and automatic update features[[52]](http://en.wikipedia.org/wiki/Android_%28operating_system%29#cite_note-unofficial-froyo-features-51),Quick switching between multiple keyboard languages and their dictionaries,Voice dialing and contact sharing over Bluetooth,Support for numeric and alphanumeric passwords,Support for file upload fields in the Browser application,Support for installing applications to the expandable memory,[Adobe Flash](http://en.wikipedia.org/wiki/Adobe_Flash) 10.1 support[[55]](http://en.wikipedia.org/wiki/Android_%28operating_system%29#cite_note-54),Support for extra high DPI screens (320 dpi), such as 4" 720
* **On 6 December 2010, the 2.3 (Gingerbread)** SDK was released.[[57]](http://en.wikipedia.org/wiki/Android_%28operating_system%29#cite_note-gingerbread-dev-blog-56) Changes included:Updated user interface design,Support for extra-large screen sizes and resolutions ([WXGA](http://en.wikipedia.org/wiki/WXGA) and higher),]Native support for [SIP](http://en.wikipedia.org/wiki/Session_Initiation_Protocol) [VoIP](http://en.wikipedia.org/wiki/Voice_over_IP) telephony,Support for [WebM](http://en.wikipedia.org/wiki/WebM)/VP8 video playback, and [AAC](http://en.wikipedia.org/wiki/Advanced_Audio_Coding) audio encoding,New audio effects such as reverb, equalization, headphone virtualization, and bass boost,Support for [Near Field Communication](http://en.wikipedia.org/wiki/Near_Field_Communication),System-wide [copy–paste](http://en.wikipedia.org/wiki/Cut%2C_copy%2C_and_paste) functionalities,Redesigned multi-touch software keyboard,Enhanced support for native code development,Audio, graphical, and input enhancements for game developers,Concurrent [garbage collection](http://en.wikipedia.org/wiki/Garbage_collection_%28computer_science%29) for increased performance,Native support for more sensors (such as [gyroscopes](http://en.wikipedia.org/wiki/Gyroscope) and [barometers](http://en.wikipedia.org/wiki/Barometer)),A [download manager](http://en.wikipedia.org/wiki/Download_manager) for long-running downloads,Improved [power management](http://en.wikipedia.org/wiki/Power_management) and application control,Native support for multiple cameras,Switched from [YAFFS](http://en.wikipedia.org/wiki/YAFFS) to the [ext4](http://en.wikipedia.org/wiki/Ext4) filesystem
* **On 26 January 2011**, a preview of the 3.0 (Honeycomb) SDK was released. Changes include:Optimized tablet support with a new user interface,Three dimensional desktop with redesigned widgets,Refined multi-tasking,Browser enhancements including tabbed web pages, form auto-fill, bookmark syncing with [Google Chrome](http://en.wikipedia.org/wiki/Google_Chrome), and private browsing,Support for video chat using [Google Talk](http://en.wikipedia.org/wiki/Google_Talk),Hardware acceleration,Support for multi-core processors
* Ice Cream Sandwich: Possible mid-2011 release

**Features of Android**

* The platform is adaptable to larger, [**VGA**](http://en.wikipedia.org/wiki/Video_Graphics_Array)**,** [**2D graphics**](http://en.wikipedia.org/wiki/2D_computer_graphics) **library,** [**3D graphics**](http://en.wikipedia.org/wiki/3D_computer_graphics) **library** based on [OpenGL ES](http://en.wikipedia.org/wiki/OpenGL_ES) 2.0 specifications, and traditional smartphone layouts.
* [SQLite](http://en.wikipedia.org/wiki/SQLite), a lightweight [relational database](http://en.wikipedia.org/wiki/Relational_database), is used for data storage purposes
* Android supports connectivity technologies including [**GSM**](http://en.wikipedia.org/wiki/GSM)**/**[**EDGE**](http://en.wikipedia.org/wiki/Enhanced_Data_Rates_for_GSM_Evolution)**,** [**IDEN**](http://en.wikipedia.org/wiki/Integrated_Digital_Enhanced_Network)**,** [**CDMA**](http://en.wikipedia.org/wiki/Code_division_multiple_access)**,** [**EV-DO**](http://en.wikipedia.org/wiki/Evolution-Data_Optimized)**,** [**UMTS**](http://en.wikipedia.org/wiki/Universal_Mobile_Telecommunications_System)**,** [**Bluetooth**](http://en.wikipedia.org/wiki/Bluetooth)**,** [**Wi-Fi**](http://en.wikipedia.org/wiki/Wi-Fi)**,** [**LTE**](http://en.wikipedia.org/wiki/LTE_Advanced)**, and** [**WiMAX**](http://en.wikipedia.org/wiki/WiMAX)**.**
* [**SMS**](http://en.wikipedia.org/wiki/SMS) **and** [**MMS**](http://en.wikipedia.org/wiki/Multimedia_Messaging_Service) **are available forms of messaging, including threaded** [**text messaging**](http://en.wikipedia.org/wiki/Text_messaging) and now Android Cloud to Device Messaging Framework ([C2DM](http://en.wikipedia.org/w/index.php?title=C2DM&action=edit&redlink=1)) is also a part of Android Push Messaging service.
* The web browser available in Android is based on the open-**source** [**WebKit**](http://en.wikipedia.org/wiki/WebKit) **layout engine, coupled with** [**Chrome**](http://en.wikipedia.org/wiki/Google_Chrome)**'s** [**V8**](http://en.wikipedia.org/wiki/V8_%28JavaScript_engine%29) **JavaScript engine. The browser scores a 93/100 on the** [**Acid3**](http://en.wikipedia.org/wiki/Acid3) **Test.**
* While most Android applications are written in [Java](http://en.wikipedia.org/wiki/Java_%28programming_language%29), there is no [Java Virtual Machine](http://en.wikipedia.org/wiki/Java_Virtual_Machine) in the platform and Java byte code is not executed. Java classes are compiled into Dalvik executables and run on the [Dalvik virtual machine](http://en.wikipedia.org/wiki/Dalvik_virtual_machine). Dalvik is a specialized virtual machine designed specifically for Android and optimized for battery-powered mobile devices with limited memory and CPU. [J2ME](http://en.wikipedia.org/wiki/J2ME) support can be provided via third-party-applications.
* Android supports the following audio/video/still media formats: [WebM](http://en.wikipedia.org/wiki/WebM), [**H.263**](http://en.wikipedia.org/wiki/H.263)**,** [**H.264**](http://en.wikipedia.org/wiki/H.264) **(in** [**3GP**](http://en.wikipedia.org/wiki/3GP) **or** [**MP4**](http://en.wikipedia.org/wiki/MP4)[**container**](http://en.wikipedia.org/wiki/Container_format_%28digital%29)**),** [**MPEG-4 SP**](http://en.wikipedia.org/wiki/MPEG-4_Part_2)**,** [**AMR**](http://en.wikipedia.org/wiki/Adaptive_multi-rate_compression)**,** [**AMR-WB**](http://en.wikipedia.org/wiki/AMR-WB) **(in 3GP container),** [**AAC**](http://en.wikipedia.org/wiki/Advanced_Audio_Coding)**,** [**HE-AAC**](http://en.wikipedia.org/wiki/HE-AAC) **(in MP4 or 3GP container),** [**MP3**](http://en.wikipedia.org/wiki/MP3)**,** [**MIDI**](http://en.wikipedia.org/wiki/Musical_Instrument_Digital_Interface)**,** [**Ogg Vorbis**](http://en.wikipedia.org/wiki/Vorbis)**,** [**WAV**](http://en.wikipedia.org/wiki/WAV)**,** [**JPEG**](http://en.wikipedia.org/wiki/JPEG)**,** [**PNG**](http://en.wikipedia.org/wiki/Portable_Network_Graphics)**,** [**GIF**](http://en.wikipedia.org/wiki/Graphics_Interchange_Format)**,** [**BMP**](http://en.wikipedia.org/wiki/BMP_file_format)**.**
* RTP/RTSP streaming (3GPP PSS, ISMA), HTML progressive download (HTML5 <video> tag). Adobe Flash Streaming (RTMP) and HTTP Dynamic Streaming are supported by the Flash 10.1 plugin. Apple **HTTP** Live Streaming is supported by RealPlayer for Mobile and planned to be supported by the operating system in Android 3.0 (Honeycomb). Microsoft Smooth Streaming is planned to be supported through the awaited port of Silverlight plugin to Android.
* Android can use video/still cameras, [touchscreens](http://en.wikipedia.org/wiki/Touchscreen), [**GPS**](http://en.wikipedia.org/wiki/Global_Positioning_System)**,** [**accelerometers**](http://en.wikipedia.org/wiki/Accelerometer)**,** [**gyroscopes**](http://en.wikipedia.org/wiki/Gyroscope)**,** [**magnetometers**](http://en.wikipedia.org/wiki/Magnetometer)**,** [**proximity**](http://en.wikipedia.org/wiki/Proximity_sensor) and [pressure sensors](http://en.wikipedia.org/wiki/Pressure_sensor), [thermometers](http://en.wikipedia.org/wiki/Thermometer), accelerated 2D [bit blits](http://en.wikipedia.org/wiki/Bit_blit) (with hardware orientation, scaling, pixel format conversion) and accelerated 3D graphics.
* Includes a device emulator, tools for [debugging](http://en.wikipedia.org/wiki/Debugging), memory and [performance profiling](http://en.wikipedia.org/wiki/Software_performance_analysis). **The** [**integrated development environment**](http://en.wikipedia.org/wiki/Integrated_development_environment) **(IDE)** is Eclipse (currently 3.4 or greater) using the Android Development Tools (ADT) Plugin. The programming languages are Java and C/C++.
* The [Android Market](http://en.wikipedia.org/wiki/Android_Market) is a catalog of applications that can be downloaded and installed to Android devices over-the-air, without the use of a PC.
* Android has native support **for** [**multi-touch**](http://en.wikipedia.org/wiki/Multi-touch) which was initially made available in handsets such as the [HTC Hero](http://en.wikipedia.org/wiki/HTC_Hero). The feature was originally disabled at the kernel level (possibly to avoid infringing Apple's patents on touch-screen technology). Google has since released an update for the [Nexus One](http://en.wikipedia.org/wiki/Nexus_One) and the [Motorola Droid](http://en.wikipedia.org/wiki/Motorola_Droid) which enables multi-touch natively.
* **Supports** [**A2DP**](http://en.wikipedia.org/wiki/A2DP)**,** [**AVRCP**](http://en.wikipedia.org/wiki/AVRCP)**, sending files (**[**OPP**](http://en.wikipedia.org/wiki/Bluetooth_profile#Object_Push_Profile_.28OPP.29)**), accessing the phone book (**[**PBAP**](http://en.wikipedia.org/wiki/Bluetooth_profile#Phone_Book_Access_Profile_.28PBAP.2C_PBA.29)**),** voice dialing and sending contacts between phones. Keyboard, mouse and joystick ([HID](http://en.wikipedia.org/wiki/Bluetooth_profile#Human_Interface_Device_Profile_.28HID.29)) support is available through manufacturer customizations and third-party applications. Full HID support is planned for Android 3.0 (Honeycomb).
* The mainstream Android version does not support video calling, but some handsets have a customized version of the operating system which supports it, either via [**UMTS**](http://en.wikipedia.org/wiki/UMTS) **network (like the** [**Samsung Galaxy S**](http://en.wikipedia.org/wiki/Samsung_Galaxy_S)**) or** over IP. Video calling through Google Talk is planned for Android 3.0 (Honeycomb).
* Android supports tethering, which allows a phone to be used as a wireless/wired hotspot. Prior to Android 2.2 this was supported by **third-party applications** or manufacturer customizations.
* Google search through Voice has been available since initial release. **Voice actions for calling**, texting, navigation etc. are supported on Android 2.2 onwards
* **Multitasking of applications** is available

**Android Architecture**

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### Commercializing

**Logo**-The Android logo was designed with the [Droid font family](http://en.wikipedia.org/wiki/Droid_%28font%29) made by [Ascender Corporation](http://en.wikipedia.org/wiki/Ascender_Corporation).Android Green is the color of the Android Robot that represents the Android operating system. The print color is PMS 376C and the RGB color value in hexadecimal is #A4C639,.

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Data collected during two weeks ending on January 4, 2011

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| --- | --- | --- |
| **Platform**↓ | **API Level**↓ | **Distribution**↓ |
| Android 2.3 (Gingerbread) | 9 | 0.4% |
| Android 2.2 (Froyo) | 8 | 51.8% |
| Android 2.0/2.1 (Eclair) | 7 | 35.2% |
| Android 1.6 (Donut) | 4 | 7.9% |
| Android 1.5 (Cupcake) | 3 | 4.7% |

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**Android SDK**

The Android [software development kit](http://en.wikipedia.org/wiki/Software_development_kit) (SDK) includes a comprehensive set of development tools. These include a [debugger](http://en.wikipedia.org/wiki/Debugger), [libraries](http://en.wikipedia.org/wiki/Software_library), a handset [emulator](http://en.wikipedia.org/wiki/Emulator) (based on [QEMU](http://en.wikipedia.org/wiki/QEMU)), documentation, sample code, and tutorials. Currently supported development platforms include computers running [Linux](http://en.wikipedia.org/wiki/Linux_kernel) (any modern desktop [Linux distribution](http://en.wikipedia.org/wiki/List_of_GNU/Linux_distributions)), [Mac OS X](http://en.wikipedia.org/wiki/Mac_OS_X) 10.4.9 or later, [Windows XP](http://en.wikipedia.org/wiki/Windows_XP) or later. The officially supported [integrated development environment](http://en.wikipedia.org/wiki/Integrated_development_environment) (IDE) is [Eclipse](http://en.wikipedia.org/wiki/Eclipse_%28software%29) (currently 3.4, 3.5 or 3.6) using the Android Development Tools (ADT) Plugin, though developers may use any text editor to edit Java and XML files then use [command line](http://en.wikipedia.org/wiki/Command_line) tools ([Java Development Kit](http://en.wikipedia.org/wiki/Java_Development_Kit) and [Apache Ant](http://en.wikipedia.org/wiki/Apache_Ant) are required) to create, build and debug Android applications as well as control attached Android devices (e.g., triggering a reboot, installing software package(s) remotely)Enhancements to Android's SDK go hand in hand with the overall Android platform development. The SDK also supports older versions of the Android platform in case developers wish to target their applications at older devices. Development tools are downloadable components, so after one has downloaded the latest version and platform, older platforms and tools can also be downloaded for compatibility testing.

Android applications are packaged in [.apk](http://en.wikipedia.org/wiki/APK_%28file_format%29) format and stored under /data/app folder on the Android OS (the folder is accessible to root user only for security reasons). APK package contains .dex files (compiled byte code files called [Dalvik](http://en.wikipedia.org/wiki/Dalvik_Virtual_Machine) executable), resource files, etc.

**Conclusion**

 **A**ndroid is open to all industry developers and users and participating in many of the open source projects. Aim is to be as build for as the web. Google android is next stepping level of mobile internet. if you are appearing for a hard-line phone palletized with features and enthusiastic web cropping then this could be the phone for you earlier reports from analysts at Gartner who forecasted that Android would become the number one operating system in the U.S. by the end of 2010 and could steal the number one spot from Symbian in global market share by 2014.